DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Today's webinar:

Diagnosis and Management of Post-traumatic Headache

May 8, 2014, 1-2:30 p.m. (EDT)

Moderator

Christian Shenouda, M.D.

TBI Physician

Contract support to Defense and Veterans Brain Injury Center

Silver Spring, Md.

DVBIC Defense and Veterans Brain Injury Center

DHCC Deployment Health Clinical Center

National Center for Telehealth & Technology

DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Today's webinar:

Diagnosis and Management of Post-traumatic Headache

May 8, 2014, 1-2:30 p.m. (EDT)

Presenters

Jeanne M. Hoffman, Ph.D., ABPP
Associate Professor, Department of Rehabilitation Medicine
University of Washington
Seattle, Wash.

Sylvia Lucas, M.D., Ph.D.
Clinical Professor, Department of Neurology, Neurological Surgery and Rehabilitation Medicine
University of Washington,
Seattle, Wash.

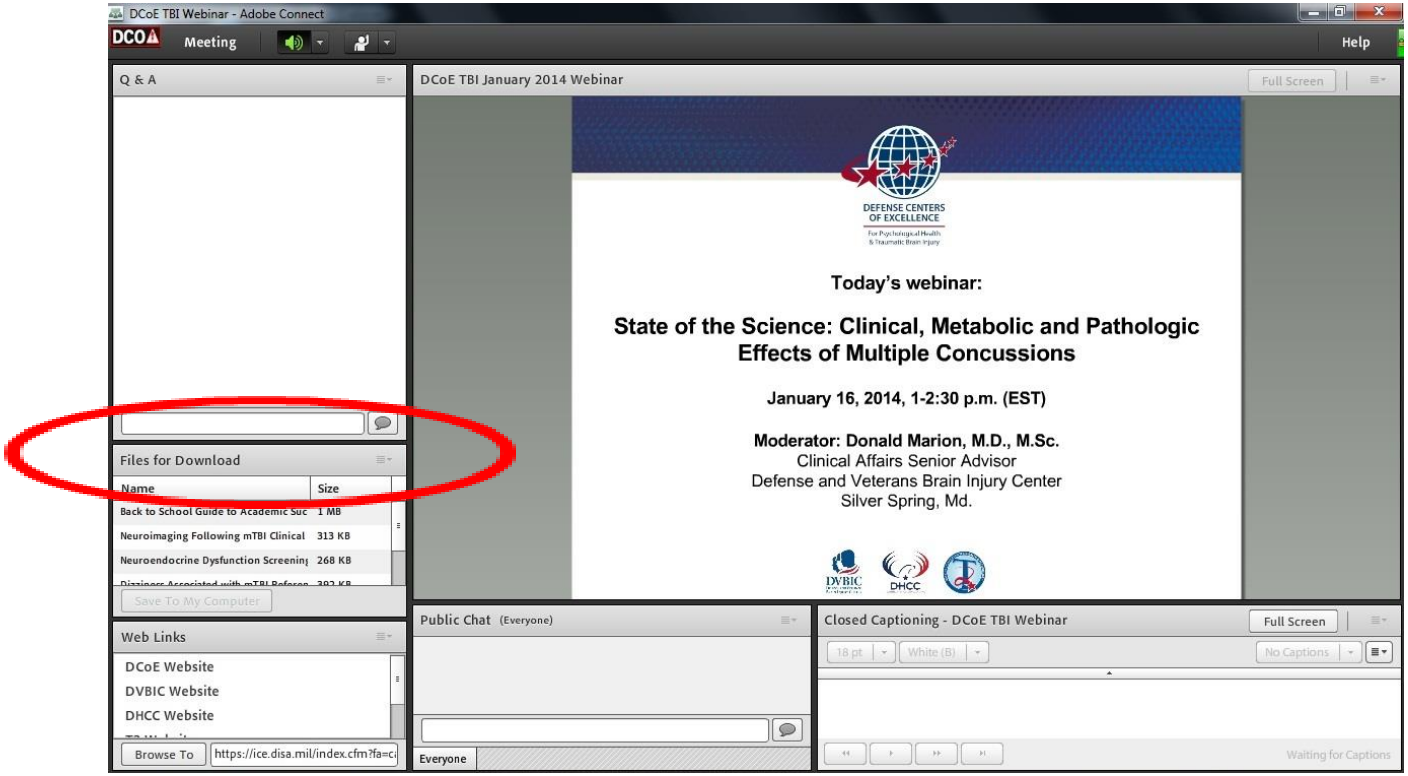
DVBIC Defense and Veterans Brain Injury Center
DHCC Deployment Health Clinical Center
National Center for Telehealth & Technology

Webinar Details

- Live closed captioning is available through Federal Relay Conference Captioning (see the “Closed Captioning” box)
- Webinar audio is **not** provided through Adobe Connect or Defense Connect Online
  - Dial: CONUS **888-877-0398**; International **210-234-5878**
  - Use participant pass code: **3938468**
- Question-and-answer (Q&A) session
  - Submit questions via the Q&A box

Resources Available for Download

- Today's presentation and resources are available for download in the "Files" box on the screen, or visit **dvbic.dcoe.mil/online-education**



Continuing Education Details

- DCoE's awarding of continuing education (CE) credit is limited in scope to health care providers who actively provide psychological health and traumatic brain injury care to active-duty U.S. service members, reservists, National Guardsmen, military veterans and/or their families.

- The authority for training of contractors is at the discretion of the chief contracting official.
  - Currently, only those contractors with scope of work or with commensurate contract language are permitted in this training.

- All who registered **prior** to the deadline on **Thursday, May 8, 2014,** at 3 p.m. (EDT) and meet eligibility requirements stated above, are eligible to receive a certificate of attendance or CE credit.

Continuing Education Details (continued)

- If you pre-registered for this webinar and want to obtain a CE certificate or a certificate of attendance, you must complete the online CE evaluation and post-test.
- After the webinar, visit http://continuingeducation.dcri.duke.edu to complete the online CE evaluation and post-test, and download your CE certificate/certificate of attendance.
- The Duke Medicine website online CE evaluation and post-test will be open through **Thursday, May 15, 2014,** until 11:59 p.m. (EDT).

Continuing Education Details (continued)

- Credit Designation – The Duke University School of Medicine designates this live webinar for:
  - 1.5 AMA PRA Category 1 Credit(s)
- Additional Credit Designation includes:
  - 1.5 ANCC nursing contact hours
  - 0.15 IACET continuing education credit
  - 1.5 NBCC contact hours credit commensurate to the length of the program
  - 1.5 contact hours from the North Carolina Psychology Board
  - 1.5 NASW contact hours commensurate to the length of the program for those who attend 100% of the program

Continuing Education Details (continued)

- ACCME Accredited Provider Statement – The Duke University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

- ANCC Accredited Provider Statement – Duke University Health System Department of Clinical Education & Professional Development is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's (ANCC's) Commission on Accreditation. 1.50 ANCC nursing contact hours are provided for participation in this educational activity. In order to receive full contact-hour credit for this activity, you must attend the entire activity, participate in individual or group activities such as exercises or pre/post-tests, and complete the evaluation and verification of attendance forms at the conclusion of the activity.

- IACET Authorized Provider Statement – Duke University Health System Clinical Education & Professional Development is authorized by the International Association for Continuing Education and Training (IACET) to offer 0.15 continuing education credit to participants who meet all criteria for successful completion of authorized educational activities. Successful completion is defined as (but may not be limited to) 100% attendance, full participation and satisfactory completion of all related activities, and completion and return of evaluation at conclusion of the educational activity. Partial credit is not awarded.

  Duke University Health System Clinical Education & Professional Development has been approved as an Authorized Provider by the International Association for Continuing Education &Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102. In obtaining this approval, Duke University Health System Clinical Education & Professional Development has demonstrated that it complies with the ANSI/IACET 1-2007 Standard, which is widely recognized as the standard of best practice in continuing education internationally. As a result of Authorized Provider status, Duke University Health System Clinical Education & Professional Development is authorized to offer IACET CEU's for its programs that qualify under the ANSI/IACET 1-2007 Standard.

Continuing Education Details (continued)

- NBCC: Southern Regional Area Health Education Center (AHEC) is a National Board for Certified Counselors and Affiliates, Inc.(NBCC)-Approved Continuing Education Provider (ACEP™) and a cosponsor of this event/program. Southern Regional AHEC may award NBCC-approved clock hours for events or programs that meet NBCC requirements. The ACEP maintains responsibility for the content of this event. Contact hours credit commensurate to the length of the program will be awarded to participants who attend 100% of the program.
- Psychology: This activity complies with all of the Continuing Education Criteria identified through the North Carolina Psychology Board's Continuing Education Requirements (21 NCAC 54.2104). Learners may take the certificate to their respective State Boards to determine credit eligibility for contact hours.
- NASW: National Association of Social Workers (NASW), North Carolina Chapter: Southern Regional AHEC will award contact hours commensurate to the length of the program to participants who attend 100% of the program.

Questions and Chat

- Throughout the webinar, you are welcome to submit technical or content-related questions via the Q&A pod located on the screen. **Please do not submit technical or content-related questions via the chat pod**.
- The Q&A pod is monitored during the webinar; questions will be forwarded to presenters for response during the Q&A session.
- Participants may chat with one another during the webinar using the chat pod.
- The chat function will remain open 10 minutes after the conclusion of the webinar.

Webinar Overview

- Headache is one of the most common persisting symptoms after traumatic brain injury (TBI) across all levels of injury severity.
- Recent research in civilian and military sample populations has improved the understanding of the prevalence and pathogenesis of the problem after TBI. However, little research has yet to be conducted on treatments for post-traumatic headache.
- This webinar will review the current research on post-traumatic headache and how symptoms of headache can assist with diagnosis. Current recommendations for treatment post-traumatic headache will be described.
- At the webinar's conclusion, participants will be able to:
  - Describe the incidence and prevalence of headache after TBI
  - Relate the critical elements for the diagnosis of headache in individuals with TBI using the symptoms of headache for classification purposes
  - Identify and employ current treatment approaches for headache after TBI

Presenter: Jeanne M. Hoffman, Ph.D., ABPP

Jeanne M. Hoffman, Ph.D., ABPP

- Associate professor in the Department of Rehabilitation Medicine at the University of Washington
- Clinical psychologist who provides patient care on the inpatient rehabilitation unit and outpatient clinic at the University of Washington Medical Center (UWMC)
- Involved in the TBI Model System research projects for 10 years
- Principal Investigator on a Module Project for the TBI Model System examining the natural history of headache
- Principal Investigator on a field-initiated grant from the National Institute on Disability and Rehabilitation Research to extend the natural history of headache project to individuals with mild TBI
- Extensive experience with the design and analysis of intervention programs for individuals with TBI including projects to evaluate the impact of exercise on mood after TBI

Presenter: Sylvia Lucas, M.D., Ph.D.

Sylvia Lucas, M.D., Ph.D.

- Clinical professor of Neurology, Neurological Surgery and Rehabilitation Medicine at UWMC
- Founder and director of UWMC Headache Clinic
- Recipient of the Wadsworth Clinical Term Professorship in Headache Research and Practice
- Member of the American Academy of Neurology, Washington State Neurological Society, American Headache Society and International Headache Society; member of board of directors of the Headache Cooperative of the Pacific
- Research interests include post-traumatic headache and headache therapeutics
- Published in journals, including “Nature,” “Journal of Neurophysiology,” “Cephalalgia,” “Headache” and “Journal of Neurotrauma”
- Received the Harold Lamport Biomedical Research Prize

DEPARTMENT OF REHABILITATION MEDICINE

Diagnosis and Management of Post-traumatic Headache

Jeanne M. Hoffman, Ph.D., ABPP

Sylvia Lucas, M.D., Ph.D.

Disclosures

- The views expressed in this presentation are those of the presenters and do not reflect the official policy of the Defense Department or the U.S. Government.
- The presenters do not intend to discuss the off-label/ investigative (unapproved) use of commercial products or devices.
- Dr. Hoffman has no relevant relationships to disclose.
- Dr. Lucas discloses these relationships:
  - Research support: St. Jude Medical, Inc., Amgen, MAP Pharma/Allergan
  - Advisory boards: Zogenix, MAP Pharma/Allergan, Kineta
  - Honoraria: Zogenix

Background

Funding sources and research findings presented:

"**The University of Washington (UW) TBI Rehabilitation Model System**,**" National Institute on Disability and Rehabilitation Research**, Principal Investigator, Kathleen Bell. **Multi-Site Module Project**: "**The Natural History of Headache after TBI**," Primary Investigator, Jeanne Hoffman. Grant number H133A070032.

"**Natural History of Headache Following Mild Traumatic Brain Injury**," **National Institute on Disability and Rehabilitation Research,** Principal Investigator, Jeanne Hoffman. Grant number H133G090022.

Graphs, charts and tables not referenced in this presentation are associated with research study results.

Investigators

UW Investigators

- Kathy Bell, M.D.
- Sureyya Dikmen, Ph.D.
- Jeanne Hoffman, Ph.D., ABPP (PI)
- Sylvia Lucas, M.D., Ph.D.
- Nancy Temkin, Ph.D.

TBI Model System Investigators

- Cindy Braden, MA, CCC-SLP, Craig Hospital
- Allen Brown, M.D., Mayo Clinic
- Bobby Brunner, M.D., University of Alabama at Birmingham (UAB)
- Ramon Diaz-Arrastia, M.D., Ph.D., University of Texas Southwestern
- Bill Walker, M.D., Virginia Commonwealth University
- Tom Watanabe, M.D., Moss Rehab

Research on Post-traumatic Headache

Headache (HA) Diagnoses

Primary HAs

- Migraine
- Tension-type
- Cluster and its relatives
  - Trigeminal autonomic cephalgias
- Other primary HAs
  - Exertional, coital, hypnic, etc.

Secondary HAs

- Post-traumatic
- Vascular disease
- Abnormal intracranial pressure, neoplasm, etc.
- Substances
- Central nervous system infection
- Metabolic
- Cervicogenic, eyes, sinuses
- Psychiatric HA
- Neuralgias
- Other

(International Headache Society, 2004)

Definition of Post-traumatic Headache (PTH)

International Headache Society (IHS) Classification, 2nd Edition – International Classification of Headache Disorders (ICHD II)

- Meet criteria for severity of head injury (e.g., mild vs. moderate to severe TBI)
- HA develops within seven days of head injury or regaining consciousness after injury
- HA resolves within three months after head trauma (meeting criteria for acute PTH)
- Becomes chronic PTH if persists beyond three months
- BUT no distinct clinical presentation or unique signs
- And timeline for development may be problematic

(International Headache Society, 2004)

How PTH is Defined in the Literature

- Any HA temporally related to TBI
  - No specific classification based on symptoms
- Some follow primary HA diagnostic criteria
- Often variable timing for HA latency following injury

Incidence and Prevalence of PTH

- PTH or HA after TBI is one of the most common persisting symptoms after injury

Rates in Service Members

- 40% of those with TBI reported HA within one week of injury
  - An additional 20% reported headache one month later
  - 40% reported HA more than one month after injury (Theeler, Flynn, & Erickson, 2010)
- Of those found to have concussion, 98% also reported PTH (Theeler & Erickson, 2012)
- Others estimate approximately 32% of those with concussion reported having HA in the past month (Hoge, McGurk, Thomas, Cox, Engel, & Castro, 2008)

Classification in Service Members

- Migraine most frequent in current research
  - Range from 36% of soldiers in a combat brigade reporting migraine HA
  - Migraine 5.4 times more likely after mild TBI
  - Sample highs of 89-95% of those with PTH meeting criteria for migraine-like HA (Erickson, 2011; Theeler, Flynn, & Erickson, 2010, 2012)

Rates in Civilian Samples

- Early research rates range from 30-90% depending on the study (Nicholson & Martelli, 2004; Solomon, 2005)
  - Time post-injury variable
  - Often clinic samples

- Prospective studies
  - Range from 65% at one month, 26% at one year (Dikmen, Machamer, Fann, & Temkin, 2010)
  - 100% at time of injury, 30% at one month, 15% at three months (Faux & Sheedy, 2009)
  - 66% within 7-10 days of injury, none at three months post-injury (Lieba-Samal, Platzer, Seidel, Klaschterka, Knopf, & Wober, 2011)

Rates in Civilian Samples (continued)

- Limited research in athletes
  - Up to 85% with sports-related concussion with PTH (Guskiewicz, Weaver, Padua, & Garrett, 2000)

- Evidence of HA becoming persistent
  - 19-22% at one year post-injury (Dikmen, Machamer, Fann, & Temkin, 2010; Lew, Lin, Fuh, Wang, Clark, & Walker, 2006; Whiteneck, Brooks, Mellick, Harrison-Felix, Terrill, & Noble, 2004)

Natural History of HA Studies

Studies funded by the National Institute on Disability and Rehabilitation Research

- TBI Model System Module Study – Total N = 452
  - Natural history of HA after moderate to severe TBI
  - Seven centers participated: UW, Mayo Clinic, Craig Hospital, MossRehab, UAB, UTS and VCU

- Field Initiated Program – Total N = 212
  - Natural history of HA after mild TBI
  - UW

Methods

- Baseline assessment: Moderate to severe TBI cohort prior to discharge from acute inpatient rehabilitation;

  mild cohort within seven days of injury
- 3-, 6-, 12-month follow-up via telephone
- Assess
  - Incidence and prevalence
  - HA characteristics

PTH Early After Injury

- Moderate to severe TBI
  - 41% assessed during inpatient rehabilitation
  - 71% reported HA across the first year

- Mild TBI
  - 54% assessed within seven days of injury
  - 91% reported HA across the first year

(Hoffman et al., 2011; Lucas, Hoffman, Bell, & Dikmen, 2013)

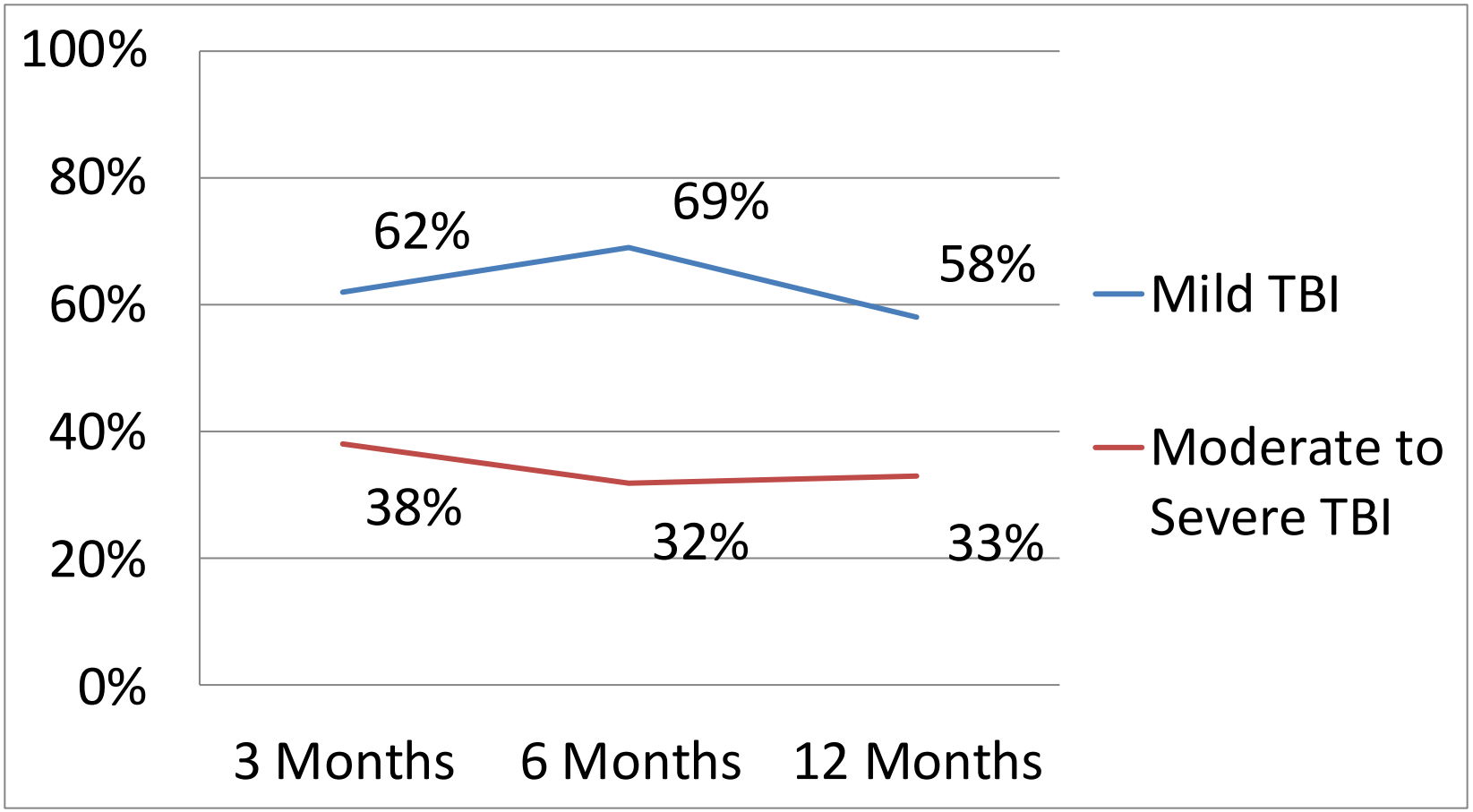
Comparison of Moderate to Severe TBI to Mild TBI

- Focus on individuals with NEW or WORSE HA following injury
  - Approximately 18% in both groups had pre-injury HA

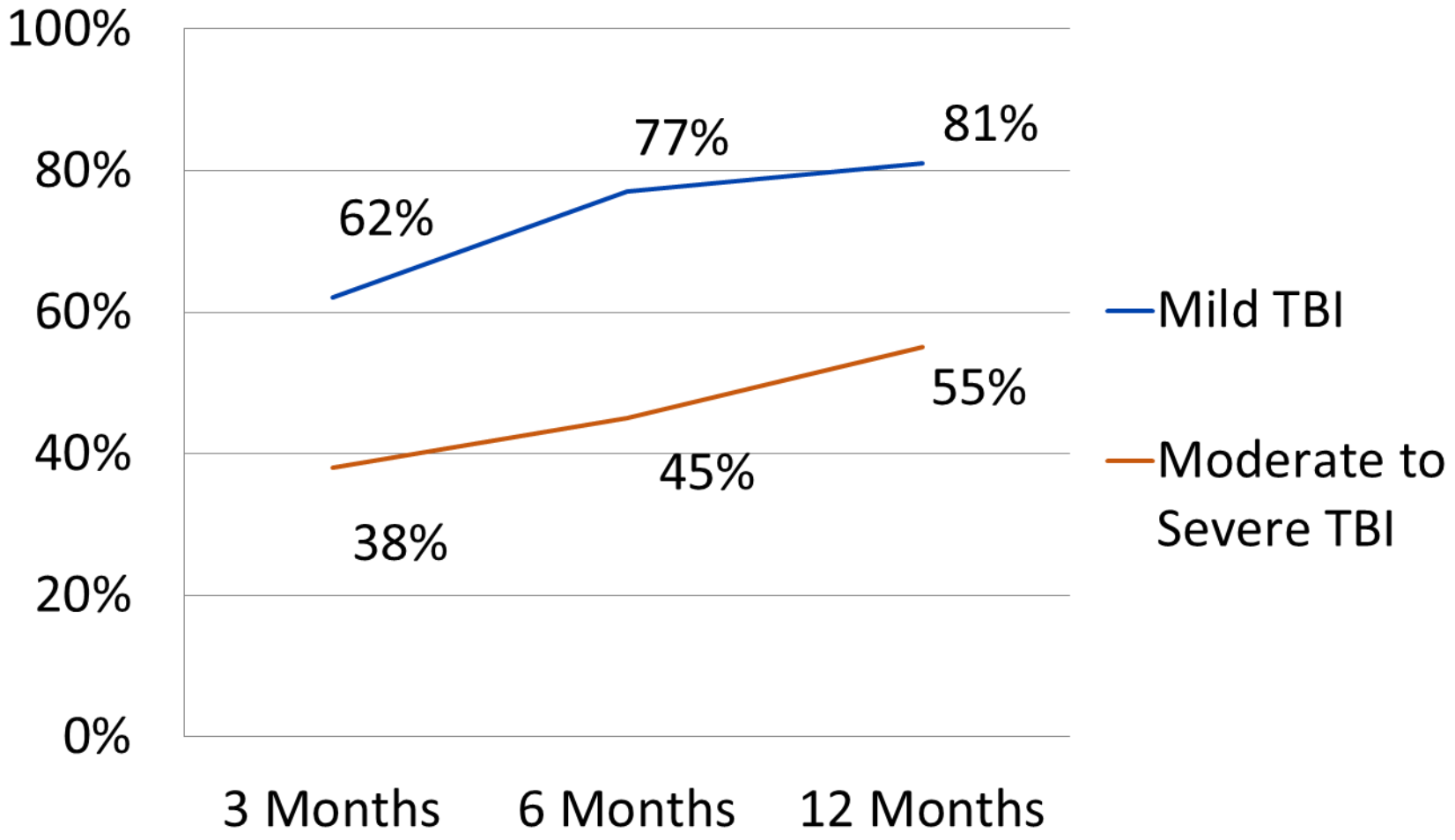
- Groups compared at 3, 6, 12 months post injury

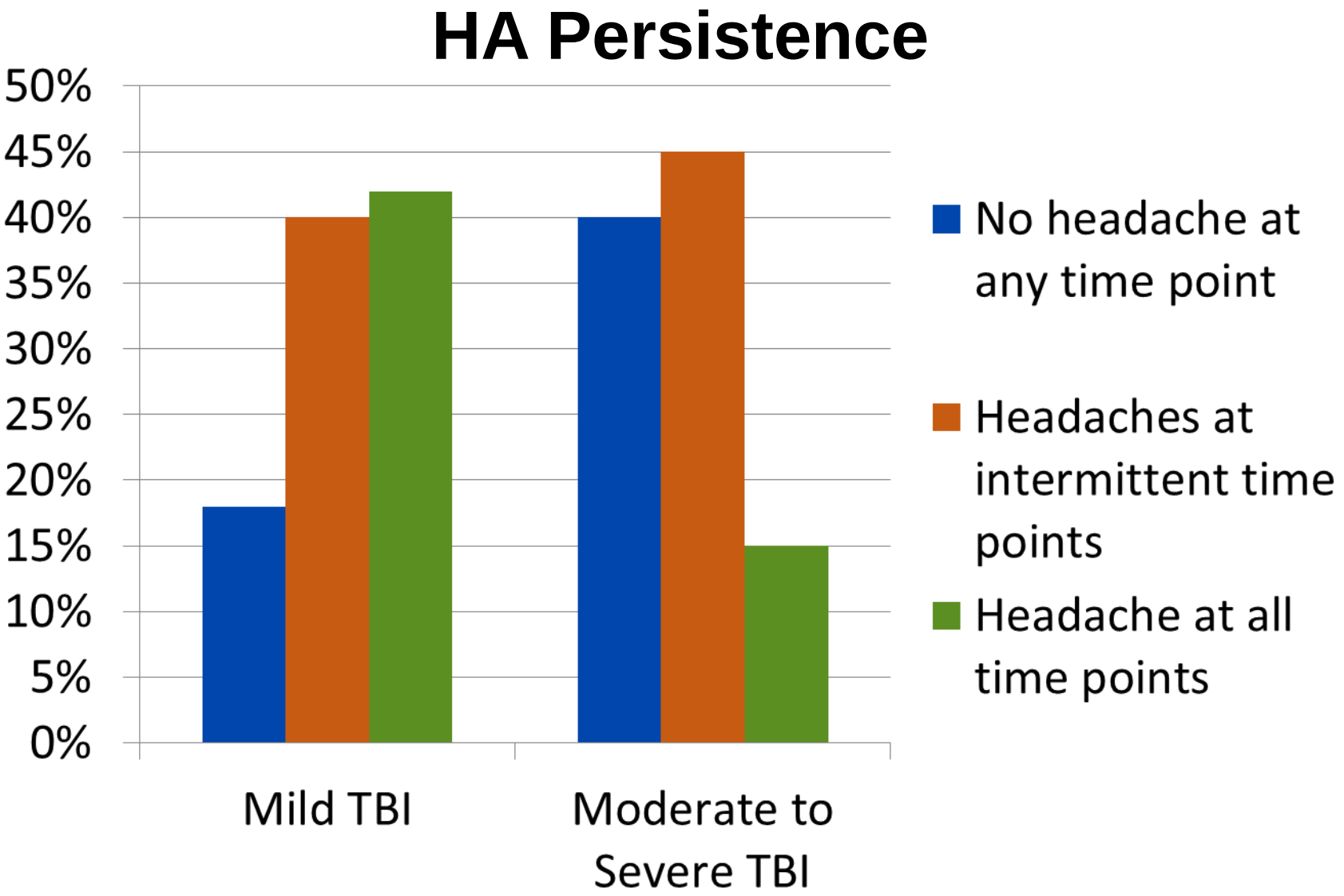
	Moderate to Severe TBI N=403	Mild TBI N=212
Age (years)	42.5	44.4
Male	72%	76%
Race (white)*	75%	75%
High School*	72%	83%
Cause of Injury*		
Vehicle	56%	58%
Assault	9%	5%
Sports	3%	3%
Fall	27%	24%
Hit by Object	2%	2%
Other	3%	8%

Prevalence of New or Worse HA in the Year after TBI



Cumulative Incidence of New or Worse HA




HA Persistence
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Mild TBI
Moderate to Severe TBI
No headache at any time point
Headaches at intermittent time points
Headache at all time points

HA Classification

- Migraine/probable migraine
  - Pain was moderate to severe
  - At least two of the following
    - Significant disabling impact
    - Unilateral
    - Throbbing/pulsating
    - Worsened with movement
    - Either nausea and/or vomiting or sensitivity to light and sound

HA Classification (continued)

- Tension
  - Pain was mild to moderate.
  - Bilateral
  - Vice-like or minimal disabling impact

- Cervicogenic
  - Pain was mild to severe.
  - Unilateral
  - Neck pain

Classification of New or Worse HA

	3 Months		6 Months		12 Months	
	Mod/ Sev	Mild	Mod/ Sev	Mild	Mod/ Sev	Mild
Migraine/ Probable Migraine	60%	49%	59%	49%	61%	49%
Tension	11%	37%	13%	40%	14%	32%
Cervicogenic	5%	4%	3%	4%	4%	4%
Unclassifiable	23%	10%	25%	8%	21%	16%

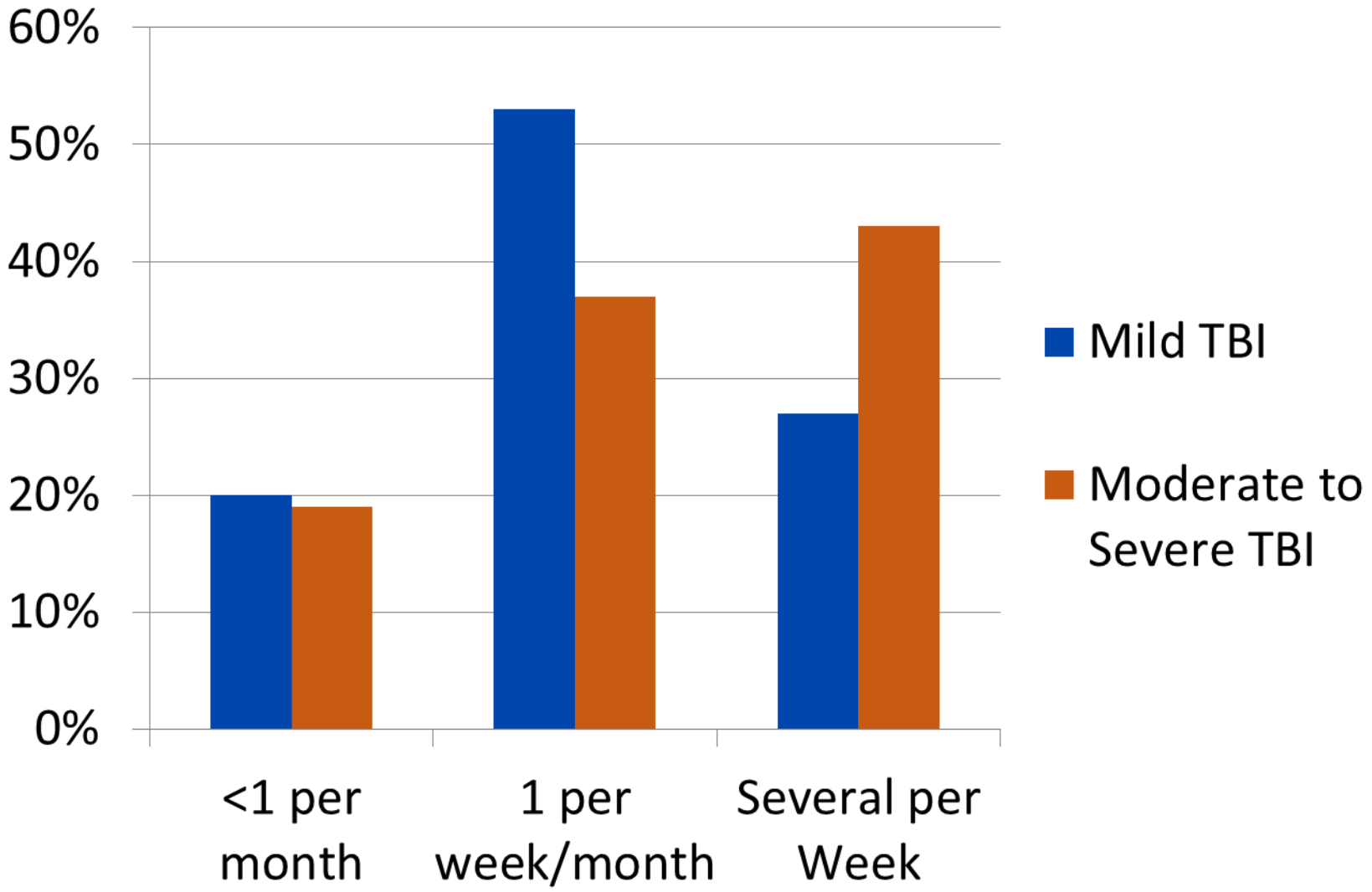
Classification (continued)

	3 Months		6 Months		12 Months	
	Mod/ Sev	Mild	Mod/ Sev	Mild	Mod/ Sev	Mild
Migraine/ Probable Migraine	60%	49%	59%	49%	61%	49%
Tension	11%	37%	13%	40%	14%	32%
Cervicogenic	5%	4%	3%	4%	4%	4%
Unclassifiable	23%	10%	25%	8%	21%	16%

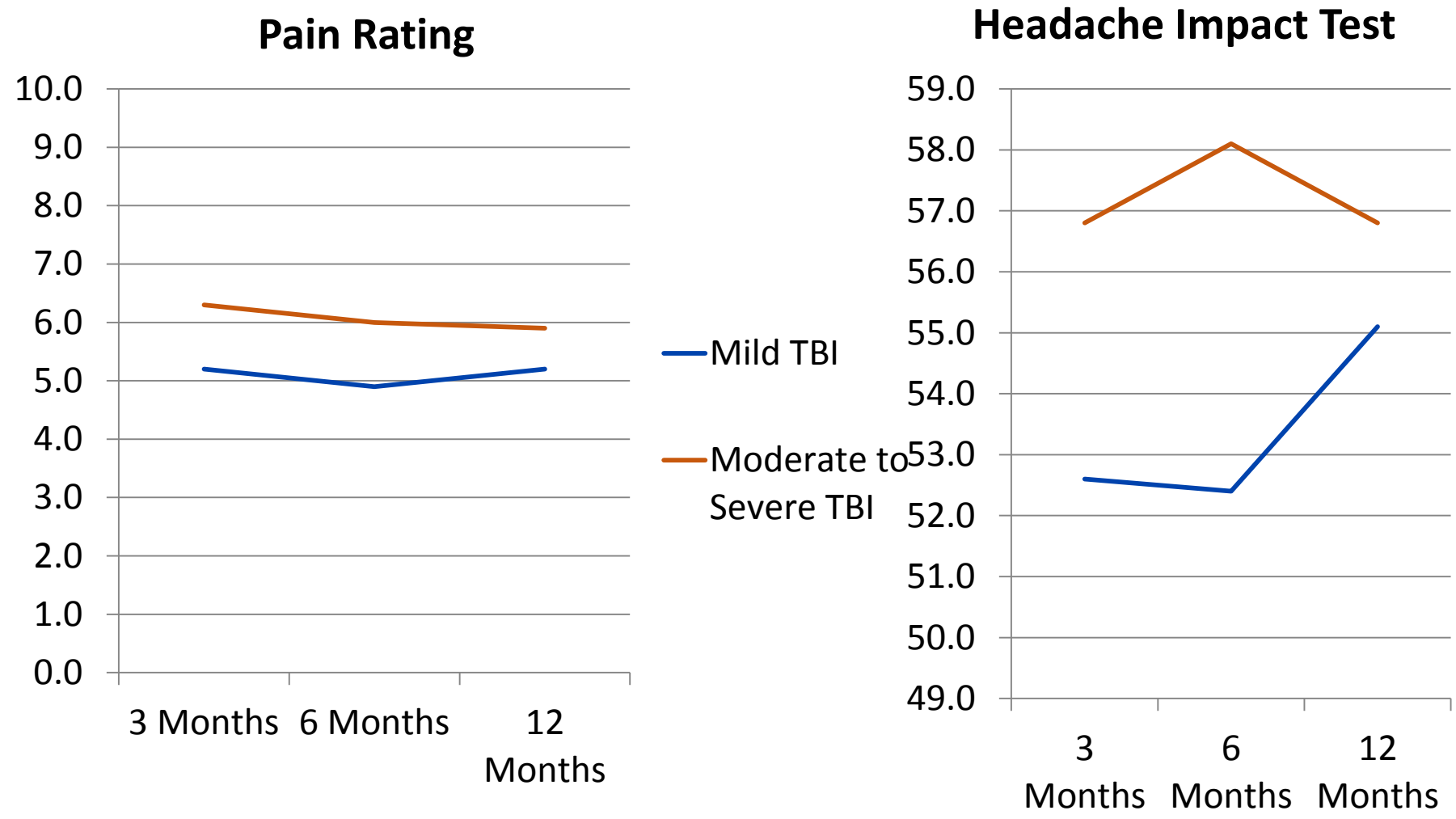
Classification (continued)

	3 Months		6 Months		12 Months	
	Mod/ Sev	Mild	Mod/ Sev	Mild	Mod/ Sev	Mild
Migraine/ Probable Migraine	60%	49%	59%	49%	61%	49%
Tension	11%	37%	13%	40%	14%	32%
Cervicogenic	5%	4%	3%	4%	4%	4%
Unclassifiable	23%	10%	25%	8%	21%	16%

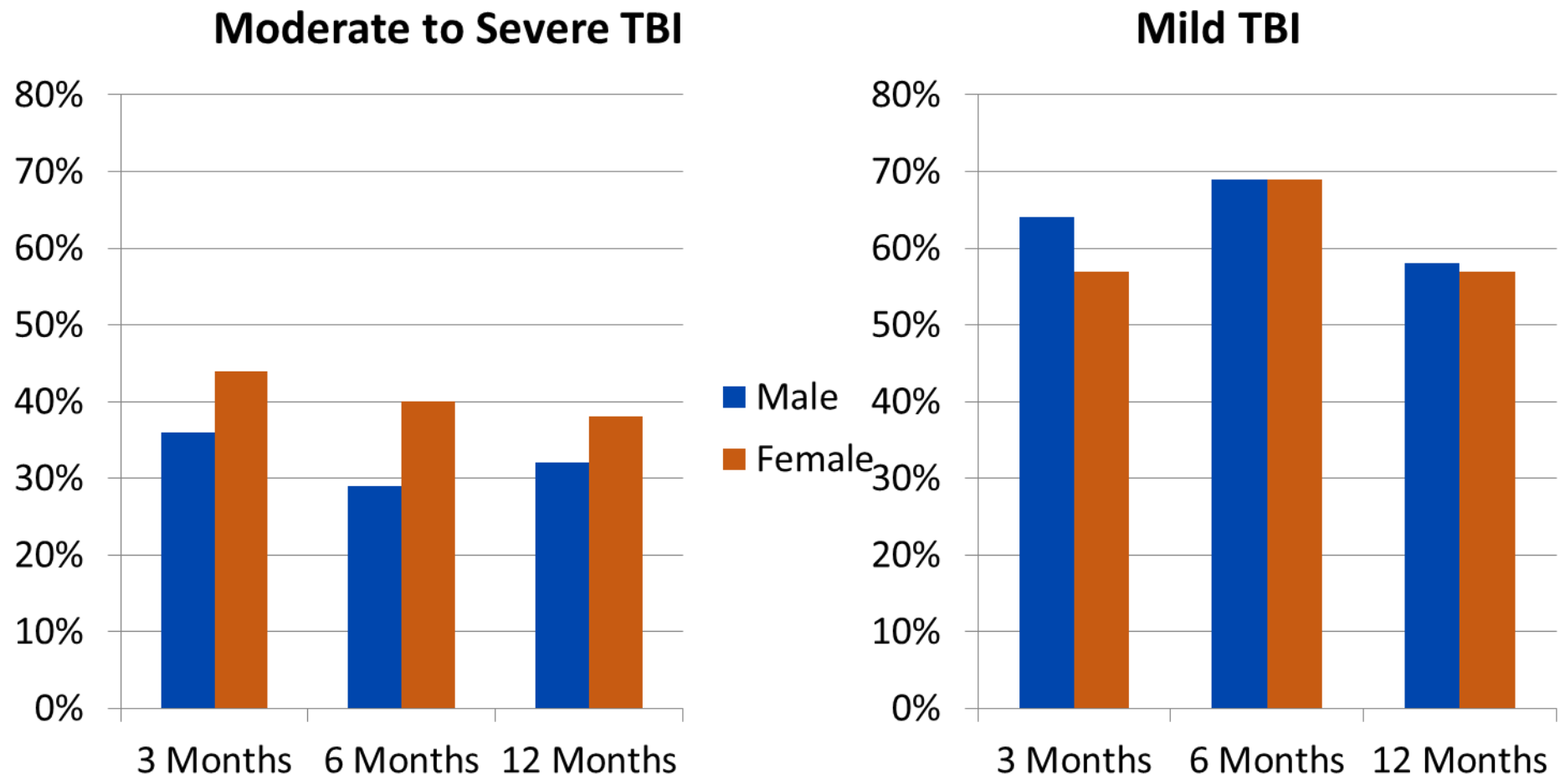
Frequency of HA at One Year



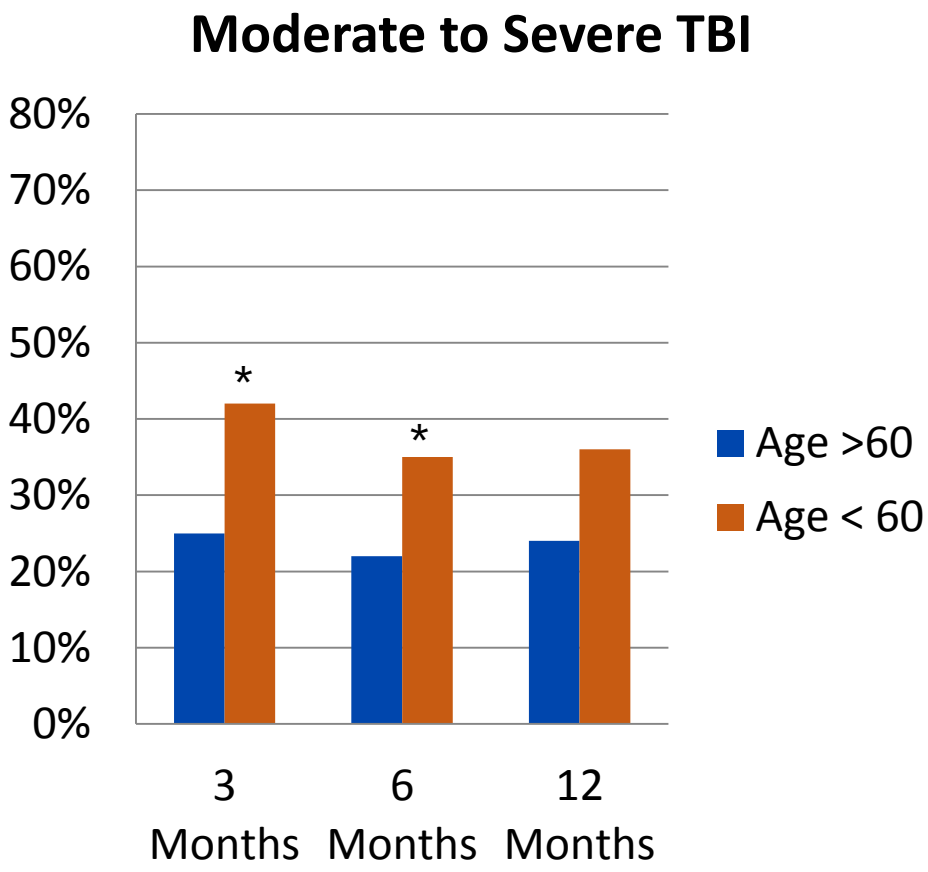
Impact of HA

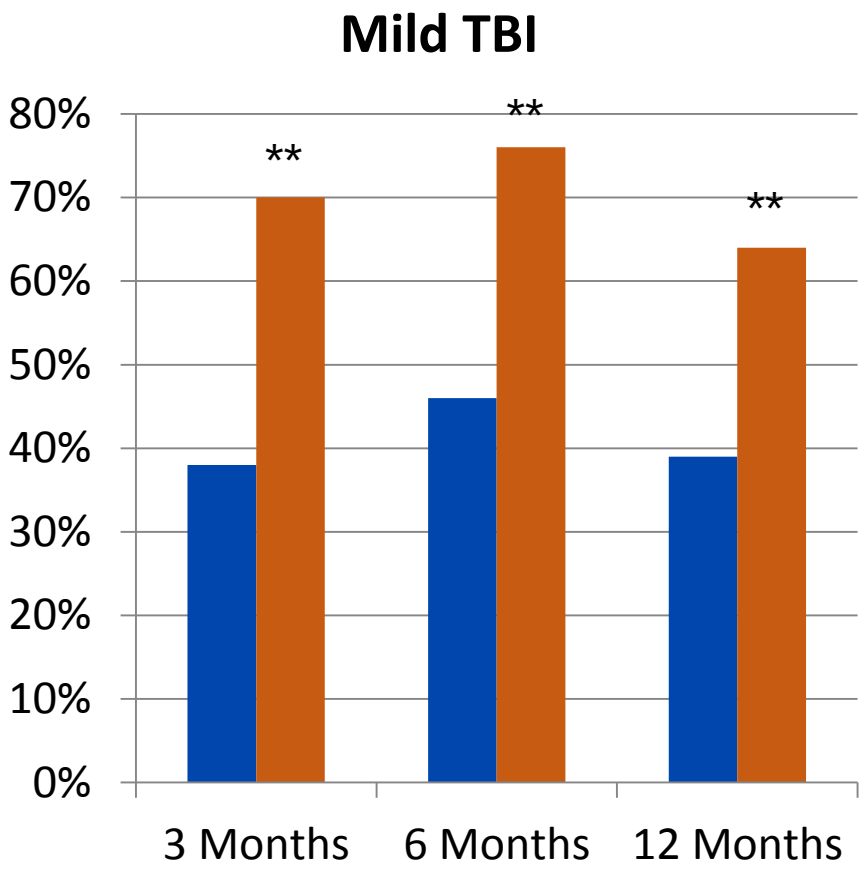

Pain Rating
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3 Months
6 Months
12 Months
Mild TBI
Moderate to Severe TBI
Headache Impact Test
59.0
58.0
57.0
56.0
55.0
54.0
53.0
52.0
51.0
50.0
49.0
3 Months
6 Months
12 Months

Risk Factors – Sex



Risk Factors – Age





*p≤ .05, **p≤ .01

Conclusions

- HAs are frequent after TBI with a higher prevalence after mild than moderate to severe TBI
  - However, HA appears to be more severe in those with moderate to severe TBI
- Majority meet ICHD classification as migraine and probable migraine
- Age appears to be a risk factor for the development of HA

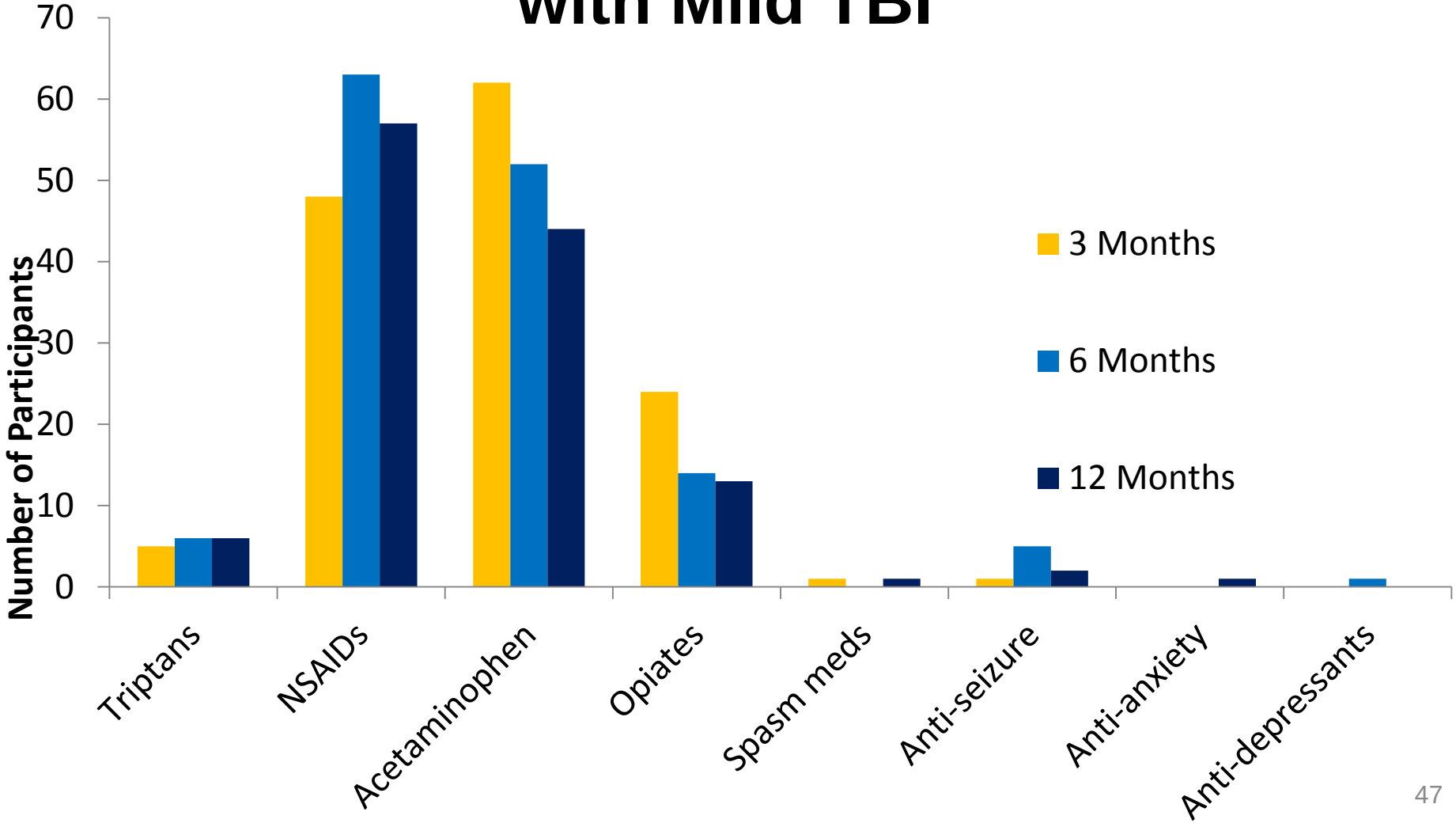
Treatment of PTH

Previous Research

- In a review of interventions for PTH conducted in 2012 – one class II, rest III or IV
  - Pharmacotherapy
  - Biologically-based (biofeedback, physical therapy (PT), manual therapy, ice, injection)
  - Behavioral interventions (cognitive behavioral therapy (CBT), relaxation, education)
  - No evidence-based guidelines

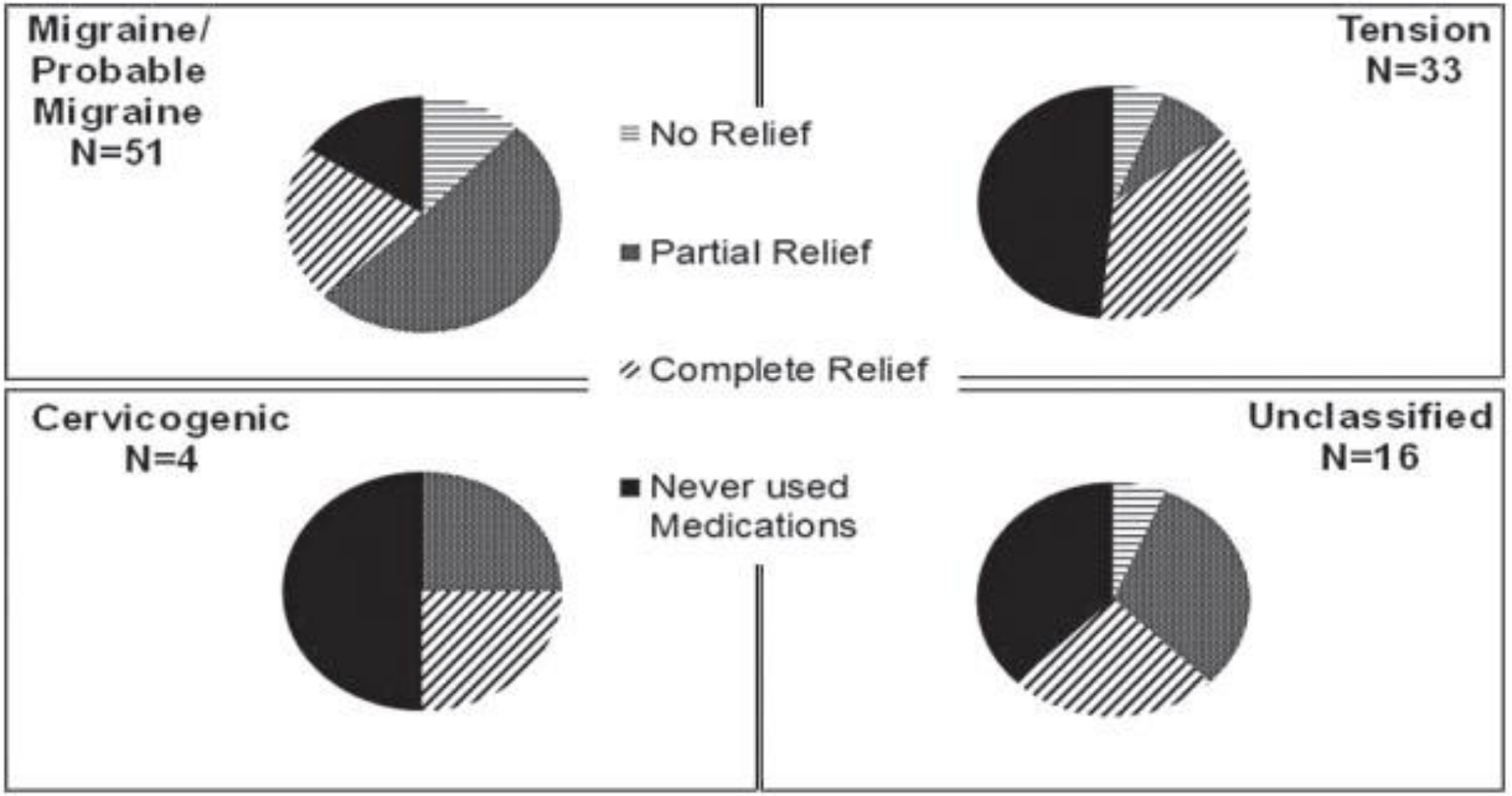
(Watanabe, Bell, Walker, & Schomer, 2012)

Self-Report of Treatment in Those with Mild TBI



(DiTommaso, Hoffman, Lucas, Dikmen, Temkin, & Bell, 2014)

Reported Effectiveness of Medication by HA Phenotype at 12 months Post Injury



(DiTommaso, Hoffman, Lucas, Dikmen, Temkin, & Bell, 2014)

Conclusions

- Most people with mild TBI are using over-the-counter (OTC) medications
- Very few people use alternative treatments
  - Highest (21% of those with migraine/probable migraine) use massage
- Medication does not appear to relieve PTH
- Recommendations in the literature are based on primary HA and have not been tested

Clinical Management of PTH

The PTH

- PTH criteria define the severity, latency and duration of the HA
- No **distinct clinical presentation** for PTH
  - Location is anywhere
  - Characterization of pain is variable
  - Severity can vary widely
  - Disability may be greater relative to non-PTH
  - Frequency is variable
  - Concurrent injuries such as a neck injury may complicate the clinical presentation

Diagnostic Framework for PTH

- **Recognize** PTH following TBI.
  - Little value in acute or chronic definition
  - Latency requirement contributes to under-diagnosis (use clinical judgment past seven days after injury)
- **Evaluate** clinical features of HA.
  - Moderate to severe or disabling, location, pulsatile, physical activity makes it worse, associated features
  - Frequency may help in determining whether preventive as well as acute therapy is necessary
- **Treat** the phenotype.
- **Recognize** comorbid conditions seen with migraine.

Differentiating a Migraine from a Tension-type HA Phenotype

Migraine

- Moderate to severe
- Often unilateral (60%), aura in a minority of patients
- Exacerbated by routine activity
- Throbbing or pounding
- Nausea, vomiting, photophobia and phonophobia are common

Tension Type

- Mild to moderate
- Usually bilateral
- Squeezing, vice-like, tight
- Photophobia OR phonophobia sometimes present
- No nausea or vomiting

Treat the Phenotype

- Treat PTH as a primary HA disorder
  - Prior history of HA or family history of HA may make it more likely to respond to the treatment but this needs further study
- Severity of HA may determine need for non-specific or specific migraine therapy
  - Frequency may determine need for preventive therapy
- Consider severity of TBI and cognitive impairment in the individual with PTH and choose therapy accordingly

Strategies for Migraine Management

- Treat PTH as a primary HA disorder
  - Prior history of HA or family history of HA may make it more likely to respond to the treatment but this needs further study
- Severity of HA may determine need for non-specific or specific migraine therapy
  - Frequency may determine need for preventive therapy
- Consider severity of TBI and cognitive impairment in the individual with PTH and choose therapy accordingly

Strategies for Migraine Management

Recognize the headache type

Keep a diary to determine predictable triggers

Set realistic goals
Provide a care plan

Individualize care and recognize comorbidity

(Silberstein, 1997).

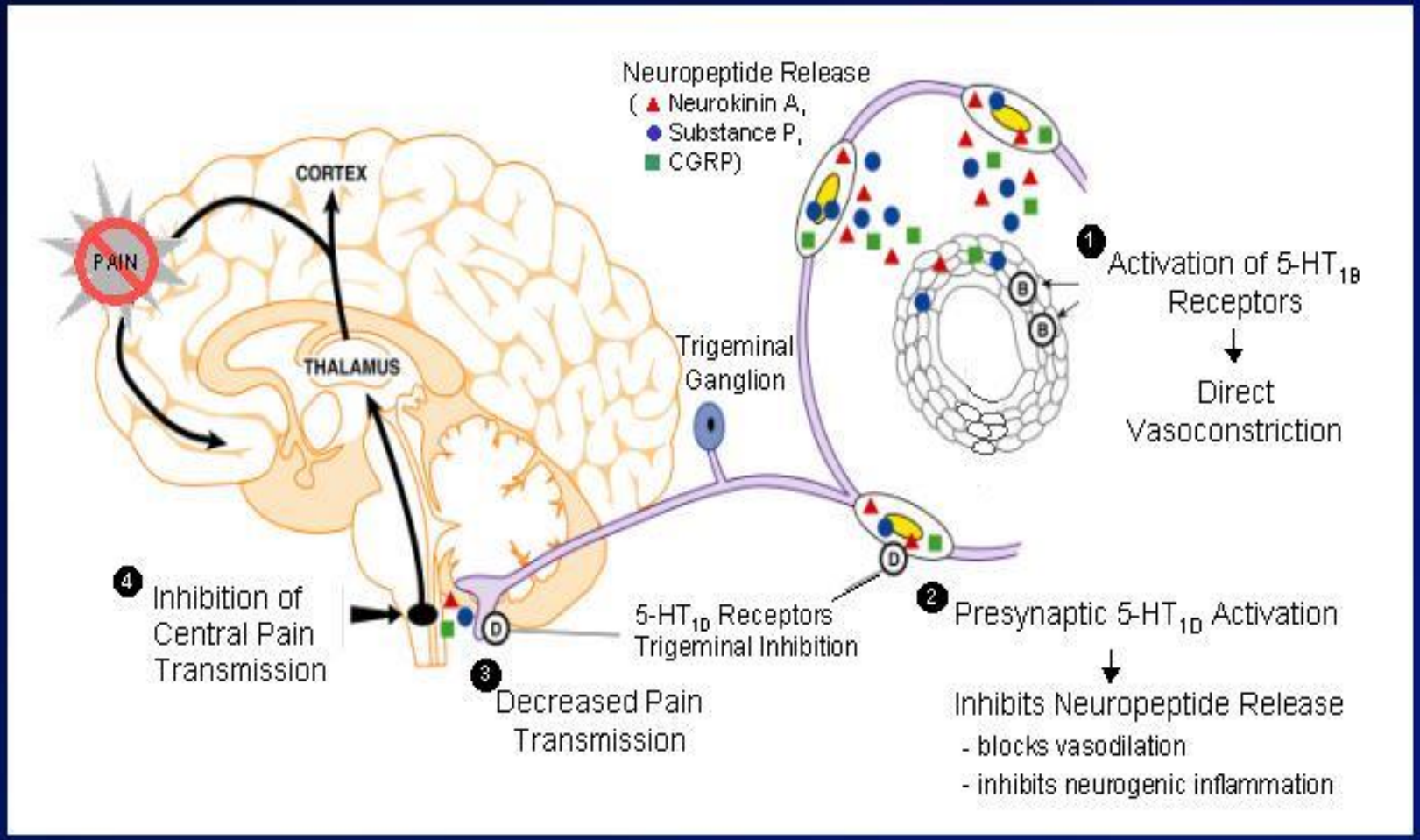
Goals of Acute Therapy

- The goal of treatment is to restore ability to function. Stratify care based on attack severity and disability.
  - Match efficacy of initial HA therapy to the treatment need.
- Treat a migraine attack as soon as possible after onset.
  - If the HA reoccurs, re-treat.
- Minimize use of back-up and rescue medications by making sure the initial drug is effective.
  - Limit use of acute therapy to avoid medication overuse headache (MOH).
- Optimize self-care by patient education and an effective treatment plan.
- Avoid or minimize side effects by choosing medication with good tolerability as initial therapy.

Acute Migraine Medications

- Nonspecific (can be prescription or OTC)
  - Simple analgesics
  - Combination analgesics
  - Non-steroidal anti-inflammatory drugs (NSAIDS)
  - Opioids
  - Corticosteroids
- Specific
  - Ergotamine/dihydroergotamine
  - Triptans
- Adjunctive therapies
  - Antiemetics/dopamine antagonists

Acute Anti-migraine Targets



(Adapted from Hargreaves, Shepheard 1999)

Migraine-specific Treatment Choices

(the "triptans" or ergot alkaloids)

- **Sumatriptan** (Imitrex)
  - Tablet (25, 50, 100mg)
  - Injection (6mg, 4 mg stat dose)
  - Single dose vial (6mg/0.5cc)
  - Nasal spray (5, 20mg)
- Sumatriptan 85 mg and naproxen sodium 500 mg (Treximet)
- Sumatriptan needleless injection system (6mg; Sumavel)
- **Zolmitriptan** (Zomig)
  - Tablet (2.5, 5mg)
  - ZMT (2.5, 5mg)
  - Nasal spray (5.0 mg)
- **Naratriptan** (Amerge)
  - Tablet (1, 2.5mg)
- **Rizatriptan** (Maxalt)
  - Tablet (5, 10mg)
  - Orally disintegrating tablet (5, 10mg)
- **Almotriptan** (Axert)
  - Tablet (6.25,12.5mg)
- **Frovatriptan** (Frova)
  - Tablet (2.5mg)
- **Eletriptan** (Relpax)
  - Tablet (20,40mg)
- **DHE-45** (Dihydroergotamine mesylate)
  - Injectable (4mg/cc)
- **Migranal Nasal Spray**
  - 4mg/cc

Guidelines for Initiating Preventive Medication in PTH

- Frequency of HA greater than four-six per month, disability more than two-three days per month or that significantly interferes with quality of life
- Use of acute medication more than two-three times per week on average or escalating use
- Acute medications contraindicated, not tolerated or ineffective
- Use comorbid conditions to select preventive therapy
- Difference between PTH and primary HA treatment may involve cognitive changes following TBI
  - Compliance, memory, side effects of medication

Migraine Preventive Medications

- Antidepressants
  - Tricyclic antidepressants (TCA): Amitriptyline or nortriptyline 10-50 mg
  - SSRI/serotonin-norepinephrine reuptake inhibitors **(**SNRI): Fluoxetine 10-40 mg/duloxetine 20-120 mg
- Cardiovascular
  - Beta blockers: Nadolol 40-120 mg/metoprolol XL 50-100 mg/propranolol LA 60-240 mg
  - Ca channel blockers: Verapamil SR 240-360 mg; amlodipine 5-10 mg
- Antiepileptic (AEDs)
  - Divalproex/valproic acid SR 250-1500 mg
  - Topiramate 75-150 mg
  - Gabapentin 300-800 mg TID
  - Zonisamide 100-500 mg

Migraine Preventive Medications (continued)

- Dopamine antagonists
  - Chlorpromazine 25-50 mg
  - Atypicals: Seroquel 25 mg

- Other
  - NSAIDs
  - OnabotulinumtoxinA
  - Tizanadine 4-8mg or baclofen
  - Magnesium/riboflavin/feverfew
  - Memantine 20 mg BID
  - 5HT2 antagonists: Cyproheptadiene 4-8 mg, mirtazapine 15-45 mg

- Nonpharmacologic
  - Biofeedback
  - CBT
  - Acupuncture
  - PT/craniosacral therapy
  - Occipital nerve block/trigger point injections

Polling Questions

Please rate your comfort with treating HA.

A. Very comfortable
B. Comfortable
C. Somewhat comfortable
D. Not comfortable
E. N/A

Where do you seek HA diagnosis and treatment information to use in your practice?

A. Peers
B. Medical journals
C. Professional organizations, e.g., American Academy of Neurology, International Headache Society, National Headache Foundation
D. Websites
E. N/A

A Case of PTH

- A 32 year old woman is referred to a concussion program six months after she sustained an injury during her city league soccer game. She was shouldered in the right temple by an opposing player
- She was thrown to the ground, hitting the grass turf with the left side of her head. She saw stars. She does not remember a conversation with her coach immediately after the event
- She rested on the sidelines with an ice pack to treat a HA of immediate onset. That evening she noticed a stiff and painful neck

Next Day

- The next day she had trouble walking with gait imbalance. A local emergency room diagnosed her with a mild concussion
- She was treated by her primary care provider with PT which she thought made her HAs worse, cyclobenzaprine 10 mg up to three times a day and hydrocodone/APAP 10/325 mg up to four times a day
- She cannot work if she takes these medications so she usually takes ibuprofen 800 mg three or four times a day and the other medications at bedtime

The HA

- HA has been constant “24-7” with severity 5-6/10 to 10/10
- Cap-like over the vertex stopping at a band around her head with bilateral orbital pain
- Allodynia over head with severe pain
- Squeezing and throbbing when severe
- Nausea and vomiting, photophonia and phonophobia
- Severe neck pain worse with computer use
- Missing about one day per week of work
- Avoiding social activities and housework, lays on the couch because physical activity makes it worse, watches TV, trouble getting to sleep

Other Relevant History

- Has a prior history of mild HA around the time of her menstrual period
- Family history of HA: paternal grandmother, father and uncle have moderate to severe HAs
- Some recent weight loss, poor sleep and feeling anxious and unhappy
- Other medications: Oral contraceptives, vitamin D, levothyroxine

Diagnosis?

- Chronic PTH following mild TBI with concussion
- Increases in intensity at work when working on the computer
- Evaluate clinical features of HA
  - Throbbing, physical activity makes it worse, moderate to severe in intensity, nausea/occasional vomiting, photophobia and phonophobia
- Primary HA features of migraine and comorbid conditions seen with migraine/concussion
- Decision to treat with drugs commonly used for acute and preventive therapy of migraine

Medications

- Acute therapy for most severe HAs: Triptans with or without an NSAID
- Preventive therapy
  - Amitriptyline 10 mg at bedtime (sleep and pain blocker); alternative drug may be tizanidine
  - Fluoxetine 10-20 mg (for mood, chronicity of HA, synergistic with TCA effect)
  - Alternative therapies may be duloxetine or an anti-epilepsy drug

Can Any Other Diagnosis be Made?

- Currently taking ibuprofen on a daily basis, hydrocodone/APAP and cyclobenzaprine frequently
- Diagnosis: Chronic PTH but……
  - Chronic migraine?
  - MOH?
  - Cervicogenic HA?

Avoid MOH

- May occur in patients with preexisting primary HA disorders
  - Anecdotal evidence for occurrence in PTH
- Pattern of HAs and overuse of analgesics in predictable and escalating frequency
  - Waking with early morning HA
- Prevention: Limit frequency of medication use
  - Ideal to keep acute treatment to two-three days per week acute medication use but do not undertreat
- Treatment: Refractory to otherwise appropriate acute and preventive therapy
  - Withdrawal therapy

Principles of MOH

(also known as “rebound HA”)

- Taper or “cold-turkey” off medications most likely to cause MOH/rebound
- Substitute acute medications that are less likely to cause MOH/rebound (avoid caffeine-containing medications)
- Preventive program during withdrawal
  - Parenteral dihydroergotamine mesylate
  - Low-dose tizanidine with long-acting NSAIDs
  - Daily doses of a triptan for up to ten days
  - Short course of steroids, long-acting NSAIDs
- Preventive medication

Cautions:

- Opiate and barbiturate abstinence syndromes
- Increasing HA during withdrawal period

Common Comorbidities of Migraine

- Some comorbid conditions often found in individuals with migraine may also be symptoms of a concussion.
  - Depression
  - Anxiety
  - Social phobias
  - Bipolar disorder
  - Irritable bowel syndrome
  - Sleep disorders
  - Fibromyalgia

Use Comorbid Conditions to Assist with Selection of Preventive Therapy

- Anxiety
- Depression
- Irritability
- Insomnia
- Somatic pain or fibromyalgia
- Raynaud's disease
- Concentration or attention difficulty

- SSRI, SNRI, AED
- SSRI +TCA, SNRI
- SSRI, SNRI, AED
- TCA, atypical, mirtazapine
- Tizanidine, TCA, SNRI
- Ca channel blocker
- CBT

Conclusions and Future Directions

- HA is a significant problem after TBI with a large number of individuals reporting severe, often disabling HA one year following injury
- HA characterization across the entire first year after injury was most frequently consistent with migraine
- Classification of HA according to IHS primary HA criteria may assist with identifying more effective treatment for individuals with PTH
- Intervention studies are needed to determine whether HA after TBI can be treated more effectively using evidence-based guidelines an whether chronic daily HA can be prevented

Future Directions

Photo courtesy of Sylvia Lucas, M.D., Ph.D.

References

Dikmen, S., Machamer, J., Fann, J. R., & Temkin, N. R. (2010). Rates of symptom reporting following traumatic brain injury. *Journal of The International Neuropsychological Society, 16*(3), 401-411. doi: 10.1017/S1355617710000196

DiTommaso, C., Hoffman, J., Lucas, S., Dikmen, S., Temkin, N., & Bell, K. (2014). Medication usage patterns for headache treatment after mild traumatic brain injury. *Headache, 54*(3), 511-519. doi: 10.1111/head.12254

Erickson, J. C. (2011). Treatment outcomes of chronic post-traumatic headaches after mild head trauma in U.S. soldiers: An observational study. *Headache, 51*(6), 932-944. doi: 10.1111/j.1526-4610.2011.01909.x

Faux, S., & Sheedy, J. (2008). A prospective controlled study in the prevalence of posttraumatic headache following mild traumatic brain injury. *Pain Medicine, 9*(8), 1001-1011. doi: 10.1111/j.1526-4637.2007.00404.x

Guskiewicz, K. M., Weaver, N. L., Padua, D. A., & Garrett, W. E. (2000). Epidemiology of concussion in collegiate and high school football players. *American Journal of Sports Medicine, 28*(5), 643-650.

Hargreaves, R. J., & Shepheard, S. L. (1999). Pathophysiology of migraine--new insights. *Canadian Journal of Neurological Sciences, 26(Suppl. 3)*, S12-19.

Hoffman, J.M., Lucas, S., Dikmen, S., Braden, C.A., Brown, A.W., Brunner, R., Diaz-Arrastia, R.,…Bell, K.R. (2011). Natural history of headache after traumatic brain injury. *Journal of Neurotrauma, 28*(9), 1719- 1725. doi: 10.1089/neu.2011.1914

Hoge, C., McGurk, D., Thomas, J., Cox, A., Engel, C., & Castro, C. (2008). Mild traumatic brain injury in U.S. soldiers returning from Iraq. *The New England Journal of Medicine*, *358*(5), 453-463. doi: 10.1056/NEJMoa072972

International Headache Society. (2004). The international classification of headache disorders: 2nd ed. *Cephalalgia, 24(Suppl. 1)*, 9-160.

Lew, H. L., Lin, P. H., Fuh, J. L., Wang, S. J., Clark, D. J., & Walker, W. C. (2006). Characteristics and treatment of headache after traumatic brain injury: A focused review. *American Journal of Physical Medicine & Rehabilitation, 85*(7), 619-627. doi: 10.1097/01.phm.0000223235.09931.c0

References (continued)

Lieba-Samal, D., Platzer, P., Seidel, S., Klaschterka, P., Knopf, A., & Wöber, C. (2011). Characteristics of acute posttraumatic headache following mild head injury. *Cephalalgia, 31*(16), 1618-1626. doi: 10.1177/0333102411428954

Lucas, S., Hoffman, J. M., Bell, K. R., & Dikmen, S. (2013). A prospective study of prevalence and characterization of headache following mild traumatic brain injury. *Cephalalgia*, 34(2), 93-102. doi: 10.1177/0333102413499645

Nicholson, K., & Martelli, M. F. (2004). The problem of pain. *The Journal of Head Trauma Rehabilitation, 19*(1), 2-9.

Silberstein, S. D. (1997). Preventive treatment of migraine: An overview. *Cephalalgia, 17*(2), 67-72. doi: 10.1046/j.1468-2982.1997.1702067.x

Solomon, S. (2005). Chronic post-traumatic neck and head pain. *Headache, 45*(1), 53-67.

Theeler, B. J., & Erickson, J. C. (2012). Posttraumatic headache in military personnel and veterans of the Iraq and Afghanistan conflicts. *Current Treatment Options in Neurology, 14*(1), 36-49.

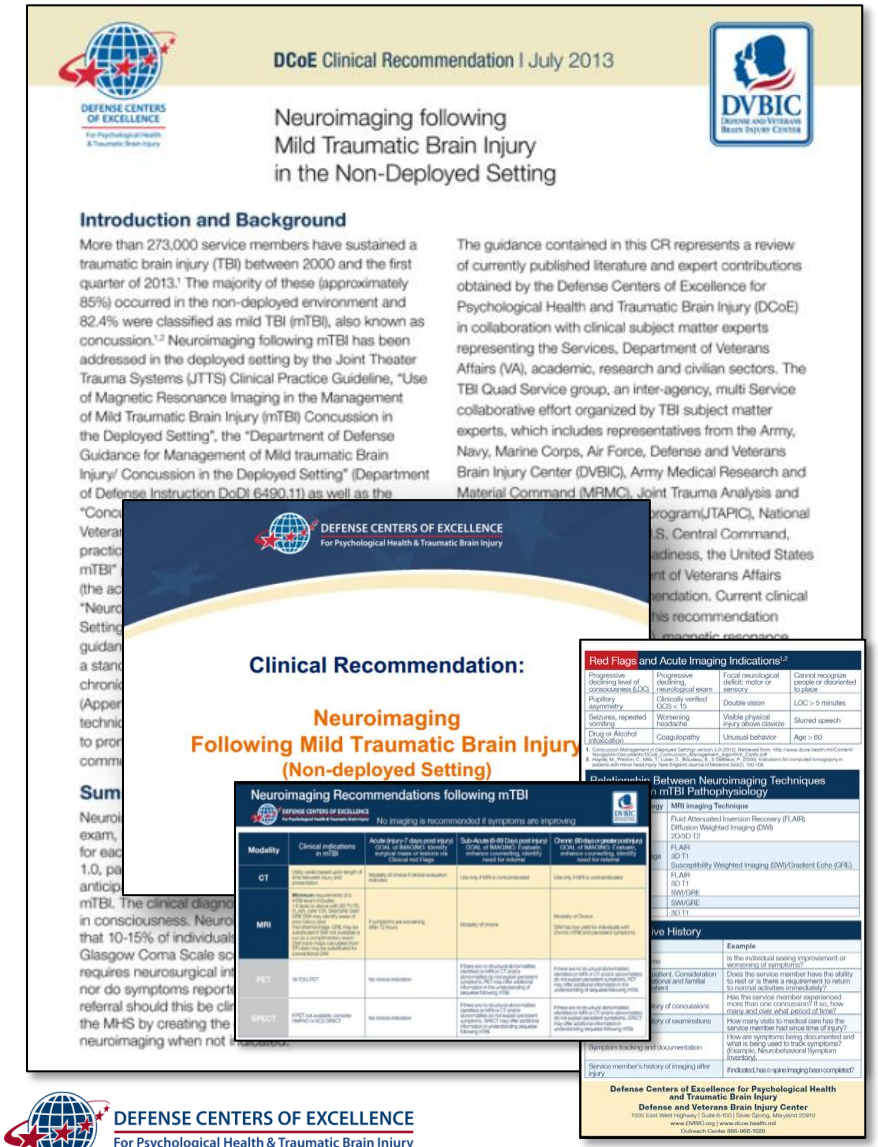
Theeler, B. J., Flynn, F. G., & Erickson, J. C. (2010). Headaches after concussion in U.S. soldiers returning from Iraq or Afghanistan. *Headache, 50*(8), 1262-1272. doi: 10.1111/j.1526-4610.2010.01700.x

Theeler, B. J., Flynn, F. G., & Erickson, J. C. (2012). Chronic daily headache in U.S. soldiers after concussion. *Headache, 52*(5), 732-738. doi: 10.1111/j.1526-4610.2012.02112.x

Watanabe, T., Bell, K., Walker, W., & Schomer, K. (2012). Systematic review of interventions for post traumatic headache. *PM&R, 4*, 129-140. doi: 10.1016/j.pmrj.2011.06.003

Whiteneck, G., Brooks, C. A., Mellick, D., Harrison-Felix, C., Terrill, M. S., & Noble, K. (2004). Population-based estimates of outcomes after hospitalization for traumatic brain injury in Colorado. *Archives of Physical Medicine and Rehabilitation, 85*(Suppl. 2), S73-81.

Neuroimaging Following Mild Traumatic Brain Injury in the Non-deployed Setting



- Provides guidance as a standard approach for imaging following mild TBI in the non-deployed setting to include:
  - When to order neuroimaging studies and other referrals
  - Type of neuroimaging indicated
  - Other clinical factors to consider
- Packaged with the clinical support tool
- Target audience: medical providers

Download or order at dvbic.dcoe.mil

DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Questions?

- Submit questions via the Q&A box located on the screen.
- The Q&A box is monitored and questions will be forwarded to our presenter for response.
- We will respond to as many questions as time permits.

Continuing Education Reminder

- If you pre-registered for this webinar and want to obtain a CE certificate or a certificate of attendance, you must complete the online CE evaluation and post-test.

- After the webinar, please visit http://continuingeducation.dcri.duke.edu to complete the online CE evaluation and post-test and download your CE certificate/certificate of attendance.

- The Duke Medicine website online CE evaluation and post-test will be open through **Thursday, May 15, 2014,** until 11:59 p.m. (EDT).

Webinar Evaluation/Feedback

We want your feedback!

- Please complete the Interactive Customer Evaluation which will open in a new browser window after the webinar, or visit: https://ice.disa.mil/index.cfm?fa=card&sp=131517&s=1019&dep=*DoD&sc=11

- Or send comments to usarmy.ncr.medcom-usamrmc-dcoe.mbx.dcoe-monthly@mail.mil

Chat and Networking

The Chat function will remain open 10 minutes after the conclusion of the webinar to permit webinar attendees to continue to network with each other.

Save the Date

Next DCoE Psychological Health Webinar:

Understanding Changes to Posttraumatic Stress Disorder and Acute Stress Disorder Diagnosis in DSM-5

May 22, 2014

1-2:30 p.m. (EDT)

Next DCoE TBI Webinar:

Why Does Concussion Affect Men Differently Than Women?

June 12, 2014

1-2:30 p.m. (EDT)

DCoE Contact Info

DCoE Outreach Center

866-966-1020 (toll-free)

dcoe.mil

resources@dcoeoutreach.org